

Chapter 8

Emerging Maintenance Operations

Two-Level Maintenance (TLM) describes maintenance transformation initiatives required to sustain ground-based equipment in the first and second decades of 21st century. TLM is consistent with the Army Vision, Joint Vision 2020, Objective Force emerging concepts, and business practice changes, such as the SSF and National Maintenance Program (NMP). The TLM system can be employed in Legacy, Interim, and Objective Force designs for Army equipment (less medical, aviation, watercraft, rail, and military intelligence equipment). TLM supports initiatives such as the NMP, SSF, TSC, Battlefield Distribution (BD), TAV, Distribution Management, and Future Combat System (FCS) concepts.

ARMY MAINTENANCE TRANSFORMATION

8-1. Army Maintenance Transformation impacts all aspects of maintenance support and system design for both current and future systems. Determining which task should be performed in a given maintenance level requires careful consideration. Figure 8-1 provides a decision tree to make the correct maintenance-level assignment.

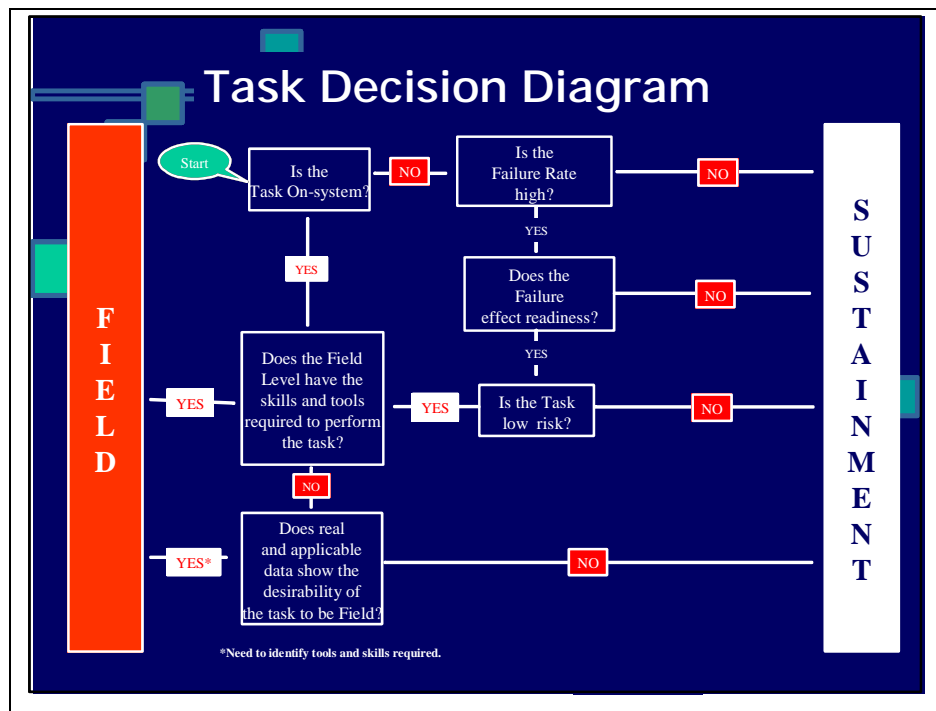


Figure 8-1. Task Decision Tree

8-2. The complete transformation will take time because of the Army's investment in current systems. The conversion to two levels of maintenance will vary from item to item and organization to organization, based upon when the item/organization entered the Army's inventory. The final

application of the concept must result in a seamless maintenance system that can sustain all the Army's equipment. Army Maintenance Transformation (AMT) consolidates maintenance levels in the current system into broad categories, which are on-system and off-system maintenance. These two maintenance systems are described below:

- On-system maintenance includes all maintenance tasks that would cause an end item to be unavailable during its operation, where the item's performance would have a direct impact on sustaining the inherent level of reliability and safety associated with an end item. To perform any given on-system task requires that the field level of maintenance has the prerequisite skills, tools, and operational needs to perform a maintenance task.
- Off-system maintenance includes both component and end item repair. Component repair is the set of all maintenance tasks that would not cause the end item to be unavailable. These are normally repair tasks performed to lower indentured components of the end item after they have been removed from the end item and replaced with a like, serviceable item. After the repair tasks are completed on these lower indentured items, they are returned to stock not to the end item from which they were removed. End item repair is maintenance performed to rebuild or the refurbishment of an item to extend its service life, apply system improvements, or repair battle damage that requires specialized equipment not easily transported in the field or requiring extensive item disassembly.

TWO-LEVEL MAINTENANCE

8-3. During the past decade, the U.S. Army has been engaged in a deliberate and sweeping effort to adapt its organizations, soldiers, equipment, and methods of operations to requirements of a rapidly changing strategic and technological landscape. The Army Vision describes the force characteristics of the future Objective Force. Emerging technologies promise a clear path to that future. The power of advanced technologies, especially information technology, enables the Army to achieve situational dominance and decision-making momentum to create a new construct for the application of force.

8-4. The Army Vision calls for transforming from a forward-deployed force to a strategically responsive Force Projection Army. The current four-level maintenance system will not meet the needs of the future force. The current maintenance system uses multiple echelons with fixed organizational structures containing redundant capabilities. Today's reactive maintenance system creates a large battlefield logprint that is reliant on multiple HQ to coordinate forward support activities (FSAs) and evacuation of inoperative systems. The replacement of the existing maintenance system with a proactive two-level maintenance system will reduce the battlespace footprint by doing the following:

- Eliminating echelonment of maintenance.
- Allowing for responsive flexibility with tailored modular organizations.
- Increasing efficiency to generate and sustain combat power.

Both the SBCT and interim division maintenance systems operate within the TLM construct.

TWO-LEVEL MAINTENANCE CONCEPT

8-5. The current Army maintenance philosophy of “fix forward” will change to a “replace forward/repair rear” TLM system in support of emerging requirements. A transition from a four- to two-level maintenance structure supports the shift to a “replace forward/ repair rear” maintenance philosophy. Characteristics of the TLM system include:

- Eliminates maintenance echeloning.
- Returns equipment to the fight faster.
- Reduces the logistics footprint in the battlespace.
- Reduces repair cycle time to generate and sustain combat power.
- Incorporate tenets of battlefield distribution.

The two levels of maintenance in a TLM system are field and sustainment (see Figure 8-2).

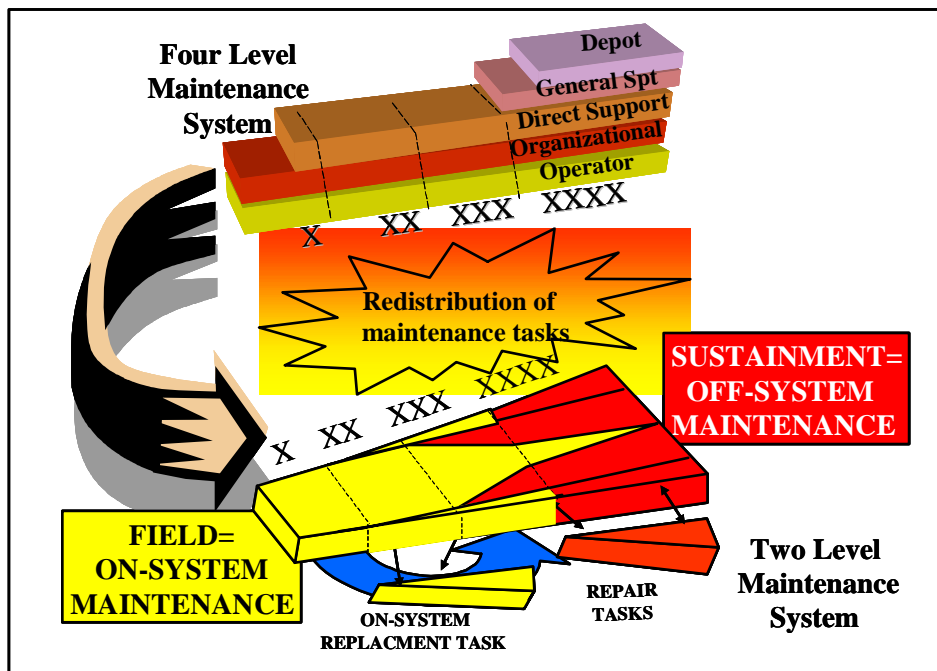


Figure 8-2. Two-Level Maintenance Program

FIELD MAINTENANCE

8-6. Field Maintenance is focused on returning a weapon system to an operational status. The field maintenance level accomplishes this mission by fault isolating and replacing the failed component, assembly, or module on the weapon system. Field maintenance is synonymous with “on system” and “replace forward.” The intent of this level is to replace the failed component, assembly, or module that returns the system to an operational status supporting the Tactical Commander’s needs. The field maintenance level consists of operators/crew and organizational and selected DS maintenance capabilities from the current four-level maintenance system. An example of a field maintenance task would be the fault isolation and replacement of a Laser Range Finder (LRF) on an Abrams tank. The field maintenance level would exchange the failed LRF for a functional LRF from the SSA.

SUSTAINMENT MAINTENANCE

8-7. Sustainment maintenance is focused on repairing components, assemblies, modules, and end items in support of the distribution system (see Figure 8-3). Sustainment maintenance is synonymous with “off system” and “repair rear.” The intent of this level is to perform commodity-oriented repairs on all supported items to one standard that provides a consistent and measurable level of reliability. The sustainment maintenance function can be employed at any point in the distribution pipeline. Ideally, sustainment maintenance activities would support from the CONUS. However, battlefield OPTEMPO may dictate that sustainment maintenance activities be located closer to the battlefield to improve support. An example of sustainment maintenance would be the repair of a failed Abrams component. The component would be retrograded to a sustainment repair activity through the supply/distribution system. Once the repair was effected, the component would be returned to the supply/distribution system as a serviceable asset.

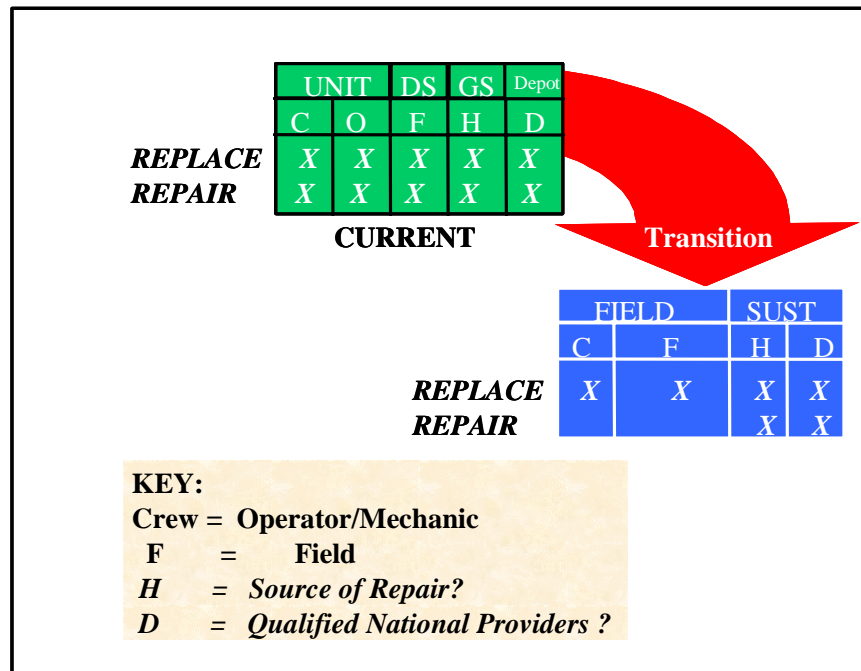


Figure 8-3. Two-Level Maintenance Repair Tasks

Field and Sustainment Maintenance Tasks

8-8. Most component repair tasks (see Figure 8-3) will be shifted to the sustainment maintenance level where components will be repaired to a national standard and returned to the supply system for redistribution. The second group of tasks to be moved will be field maintenance tasks, which are transferred to other field maintenance activities farther to the rear. Examples of tasks that fall into this category include vehicle servicing and tire mounting/repair.

8-9. The skills and abilities of the soldiers that will execute this doctrine will also change. Many of the current Ordnance Maintenance Military Occupational Specialties (MOSs) are being consolidated to create either system-specific repairmen (multi-capable mechanics) or similar skills grouped to create a new MOS capable of performing all required maintenance tasks at one location. For example, in today's structure, the failure of a wheeled vehicle major component (engine) requires the skills of at least two different maintainers (a 63B, Unit Level Wheeled Vehicle Maintainer and a 63W, Direct Support Wheeled Vehicle Mechanic) assigned to two different organizations (the owning unit and the DS unit) with two different skill sets to effect a single repair. This situation creates inefficiencies and unnecessary delays in returning the system to an operational status. The MOS consolidations in support of the two-level maintenance structure will eliminate the inefficiency of repair echelonment by empowering one maintainer with the needed skill set and authority to perform the complete repair at one location.

PERFORMING TWO-LEVEL MAINTENANCE

8-10. The difference between the current system and a TLM system is that performing either field or sustainment maintenance is a deliberate management decision. Committing maintenance resources is based on the customer's needs. Resources (people, parts/materiel, and equipment) are marshaled and dispatched to the repair site from maintenance activities that have the capability and capacity to perform required maintenance task(s). However, the customer equipment may be retrograded through the supporting distribution pipeline to a maintenance facility, which is resourced to perform the required maintenance. Field maintenance tasks are the responsibility of the tactical maintenance units and are performed in the battlespace. The primary methods of returning systems to a mission-capable status are through the use of repair parts, BDAR, controlled substitution, cannibalization, and Class VII replacement. The essential maintenance tasks for this organization are LRU, component, and major assembly replacement in the battlespace. Sustainment maintenance tasks will be coordinated at the national level. National level maintenance managers will designate and workload sources of repair of components and end items.

8-11. The key to performing maintenance in the future will be through the use of the Anticipatory Logistics system. This system continuously monitors weapon system status throughout the battlespace. Weapon systems will report their operational status through commercial technologies such as "On-Star." Equipment monitoring capabilities will transmit and respond to inquiries sending maintenance codes reporting the equipment's status. These reports, when linked to CSS distribution information and Maintenance Activity reports, will provide both field and SMMs the data required to select the best location to perform maintenance.

8-12. The TLM system will add efficiencies to today's AOE force structure. The basic efficiency will be the ability to perform a maintenance function at one location by a multi-skilled maintainer vice echelonment of maintenance to subsequent locations staffed by maintainers with narrowly focused, specialized skills. In AOE designs, unit and DS maintenance will be consolidated similarly to the maintenance capabilities found in the FXXI maneuver units (see Figure 8-4). While it is not practical for all AOE TOE to have their own FSC, fielding new Ordnance MOSs with expanded maintenance skills and automation support in existing maintenance facilities will provide a functioning field level maintenance capability. In the Objective Force and interim brigade/division designs, maintenance support will be reduced to complement deployment requirements. Backup and reinforcing maintenance support for the Objective Force or the interim brigade/division will come from above the brigade/division level (see Figure 8-4).

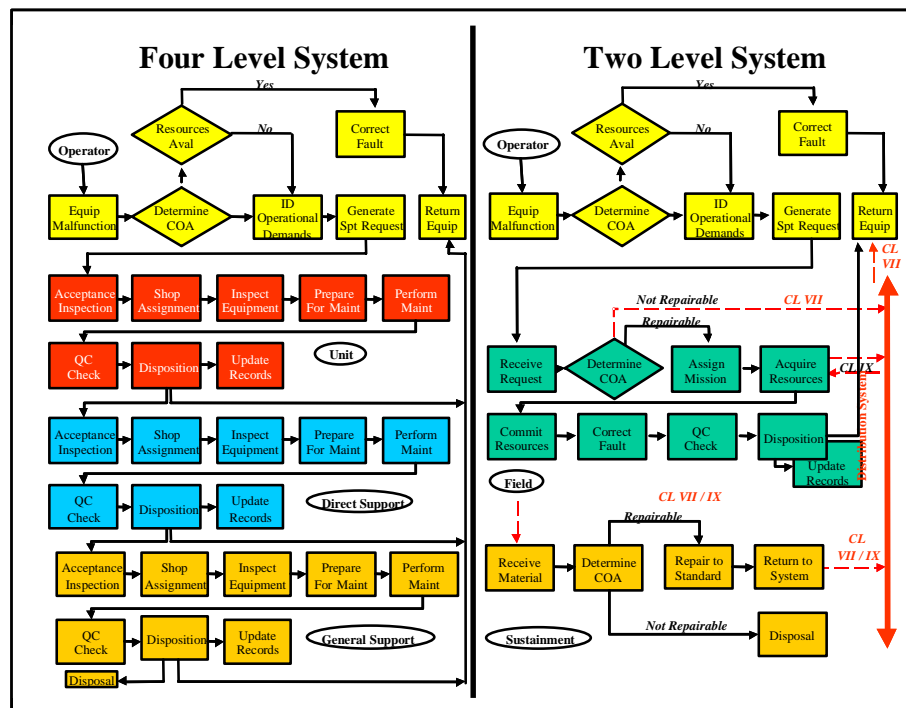


Figure 8-4. Evolving the Four-Level to the Two-Level Maintenance System

8-13. Units outside of the division that perform field maintenance (on-system) or component repair (off-system) will replace current non-divisional Maintenance Companies. These new Support Maintenance Companies (SMCs) will be tailored to perform two area-specific support missions: divisional troop support and support to EAD. The design for the company base of the units will be reduced to minimum staffing and provide C2 and maintenance management. Modular Augmentation Teams assigned to the maintenance activities will dictate the capability and capacity of an individual unit.

8-14. Maintenance augmentation modules will be designed to provide commodity-specific support. The Modular Augmentation Teams will be attached to non-divisional maintenance units to support area maintenance customers. The teams may work from a centralized unit location or be combined as required to form MSTs. The following are the two principal differences between existing Augmentation Teams and future augmentation modules:

- The new modules will be 100 percent mobile with the ability to transport all required tools and test equipment with organic assets.
- The unit designs will be capable of integrating limited numbers of civilians to augment maintenance operations.

8-15. Component Repair Companies (CRCs) will replace existing GS maintenance units. The principle difference between CRC and GS maintenance companies is the new unit only focus is the repair of components. CRCs, unlike GS maintenance units, may be located outside the AO; at any point in the distribution pipeline to repair retrograded material moving through the supply system. CRCs will be attached to CSGs or ASGs. The units will be located along the distribution pipeline to repair retrograded material moving through the supply system or in DS of area support replacement units. In a CSG (Forward), CRCs will focus on division support. The CRC design will be similar to the new non-divisional Support Maintenance Companies, as each will contain a base element with attached augmentation modules. These modules may be commodity-specific teams, similar to modular platoons assigned to existing GS maintenance units, or teams attached to the new field replacement units. The CRC will not provide area recovery support or send out MSTs. Work performed by the unit will focus on repairing fuel and electric, drive train, generator, chemical, engineer, artillery, and electronic components identified by field replacement activities as either faulty or requiring repair due to a projected failure. The CRC may have any combination of augmentation modules attached to it based upon workload and the tactical situation.

8-16. Collection and Classification Platoons will be added to the existing Collection and Classification Companies structure to enhance the return of reparable. The platoons deployed forward may be attached to a SMC or other maintenance activities. The platoons may be pushed into brigade forward areas for limited periods of time to assist in the evacuation of components and end items. The platoon's mission will be to initiate recovery or evacuation of materiel or collect key equipment components needed by theater units based upon their technical assessment. The platoon will receive day-to-day mission guidance through coordination with the MMC or DMC.

8-17. Where practical, repair cycle data will be used to create repair kits that contain the failed component part but also miscellaneous hardware, sealant an/or lubricant, and other materiel used to complete a repair. Repair kits will enable forward deployed maintenance personnel to carry forward the necessary parts and tools without carrying a "basic load" of miscellaneous shop and bench stock. Parts, lubricants, and materiel used by field maintenance personnel to repair equipment will be called "combat spares." It is the consolidation of PLL, shop stock, bench stock, and other common items found in maintenance activities. Combat spares and associated kits may be stocked on weapon platforms and support equipment,

space permitting. When stowed on an item of equipment, the spares may also be called on-board spares.

NOTE: Under a two-level maintenance system maintenance activities evacuate the workload using the distribution system. Also, backup and passback maintenance workload is evacuated to maintenance activities that have the capability and capacity to perform the work.

MAINTENANCE FUNCTIONS SUPPORTED BY TWO-LEVEL MAINTENANCE

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

8-18. PMCS are those maintenance tasks used to identify potential equipment problems. It includes quick turnaround repairs by component replacement, minor repairs, and performance of scheduled services at the operator, crew, company, and battalion/TF levels. PMCS also includes the performance of periodic scheduled checks to monitor the health condition of items of equipment. To reduce the battlefield logprint in forward areas, some equipment service tasks will be migrated to EAD level. These services generally include services on rolling stock, armament systems (25 MM and larger), and ancillary support equipment.

RECOVERY/RETROGRADE DISABLED EQUIPMENT

8-19. Recovery is a critical battlefield capability that must be organic to all tactical units and field maintenance activities. It includes the movement of damaged, discarded, condemned, or abandoned allied or enemy materiel. It includes methods, techniques, and procedures employed in recovering and evacuating disabled equipment.

DIAGNOSE EQUIPMENT FAULTS

8-20. Diagnostic equipment allows the soldier to identify malfunctions through the use of on-board sensors, external test equipment, and visual inspections. These include fault isolation, troubleshooting, battle damage/accident assessment, and differentiating between parts needing repair/replacement and serviceable parts/equipment (see Figure 8-5).

SUBSTITUTION

8-21. Remove serviceable parts, components, and assemblies from unserviceable, economically repairable equipment, or from materiel authorized disposal, and immediately reuse it in restoring a similar item of equipment to a combat-operable or serviceable condition. Includes controlled exchange of parts and cannibalization. Digitization and replacement of existing power trains with hybrid-electric systems will increase the opportunity for materiel developers to design parts that are interchangeable and scalable in function. Adoption of multipurpose parts, such as electric drive motors, which can be used on more than one family of vehicles, will reduce the number of parts required in the battlespace and increase the probability that BDAR techniques can provide a limited combat capability.

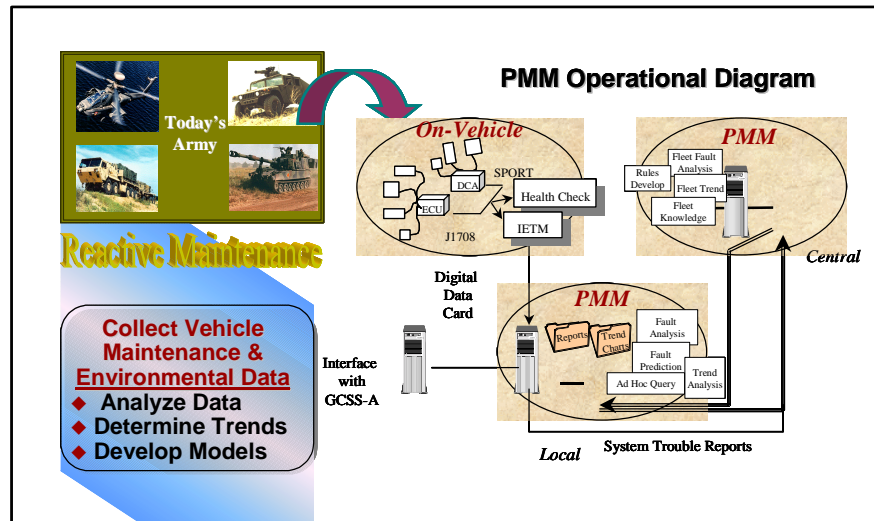


Figure 8-5. Evolving Maintenance Diagnostics

EXCHANGE

8-22. Issue serviceable materiel in direct exchange for unserviceable materiel on an item-for-item basis. Transition from a four-level maintenance system to a TLM system is assisted by new business practices and methods of support, such as the Battlefield Distribution concept. Therefore, support methods based on echeloned “maintenance to maintenance” transactions will migrate to exchange methods, which use the distribution system to retrograde equipment from forward-deployed sites to field and sustainment maintenance activities for repair support (see Figure 8-6).

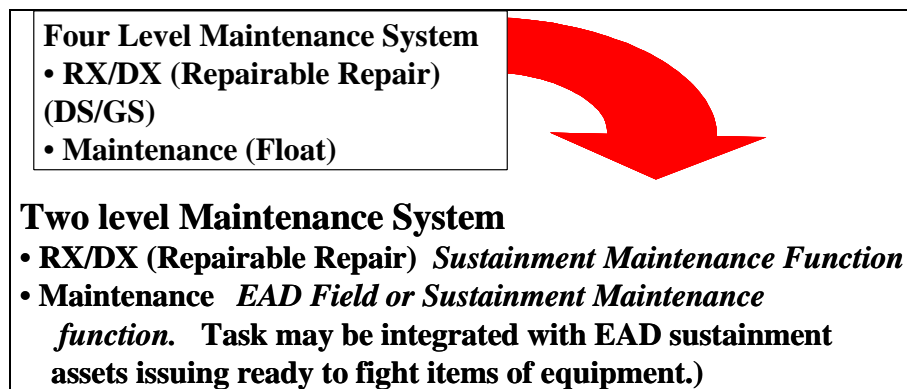


Figure 8-6. Four-level to Two-level Transition

MAINTENANCE FUNCTIONS SUPPORTED BY THE CONCEPT

NOTE: Fix Forward maintenance has been changed to two levels of maintenance (Replace Forward and Repair Rear). Replace Forward means a soldier performs “on-system” maintenance. “On-system” refers to replacing components or subcomponents at the point of repair (prior to failure based on predictive measurements) at the breakdown site or UMCP. Repair Rear means that maintainers perform “off-system” maintenance. “Off-system” refers to those actions taken to return components and subcomponents of Weapon systems to serviceable condition. Backup and passback maintenance workload is evacuated to maintenance activities that have the capability and capacity to perform the work.

REPAIR EQUIPMENT

8-23. Field and sustainment maintenance activities will restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This includes the following:

- Testing/checking equipment.
- Adjusting, aligning, and repairing components and assemblies.
- Repairing and modifying defective end items.
- Replacing components and assemblies.
- Removing/replacing piece parts.
- Marking/painting equipment.
- Systems calibration.

Field maintenance activities focus on the repair of equipment through component replacement. Sustainment maintenance activities repair equipment through both the repair of components and replacement of faulty components.

REPAIR AND RETURN EQUIPMENT TO USER

8-24. Repair and return equipment to user (see Figure 8-7) includes returning repaired equipment to the battle or supply system and providing operationally ready items to the supply stream. Ideally, equipment should be repaired as close to the customer as possible to reduce the logistics burden on the distribution/retrograde system and CWT. New warfighting concepts expanding the size of the battlespace and requiring more self-sufficient weapon platforms are changing conventional support strategies. Maintaining limited amounts of float assets in a ready-to-issue/fight configuration may dictate the creation of new modular maintenance organizations, which support supply or distribution points and maintain exchange equipment. Second, exchange or replacement of inoperative equipment items on the Objective Force battlefield may increase driver training requirements for maintenance personnel as replacements may be driven to a mission support sites.

MAINTENANCE MANAGEMENT

8-25. The revolutionary change between current and future maintenance operations will be the capability to anticipate user requirements. This capability will enable sustainment and readiness maintenance managers to direct maintenance activities that not only support ongoing operations, but position maintenance assets to provide users/commanders freedom of action in future mission/battle cycles. Readiness maintenance managers will be assigned throughout the Army structure, and their task is to maximize combat readiness by coordinating repairs as far forward for quick return of non-mission capable equipment to the battlespace. SMMs working at the operational and strategic levels oversee the repair of components and end items in support of the field maintenance activities (see Figure 8-8). Sustainment maintenance managers located at the EAD level perform two critical functions. First, they ensure field maintenance activities are provided the components and technical assistance required to repair non-mission capable items. Second, they coordinate the workloading of sustainment maintenance organizations so the maintenance system does not repair to excess and performance of all repairs meet a standard that results in a measurable component service life.

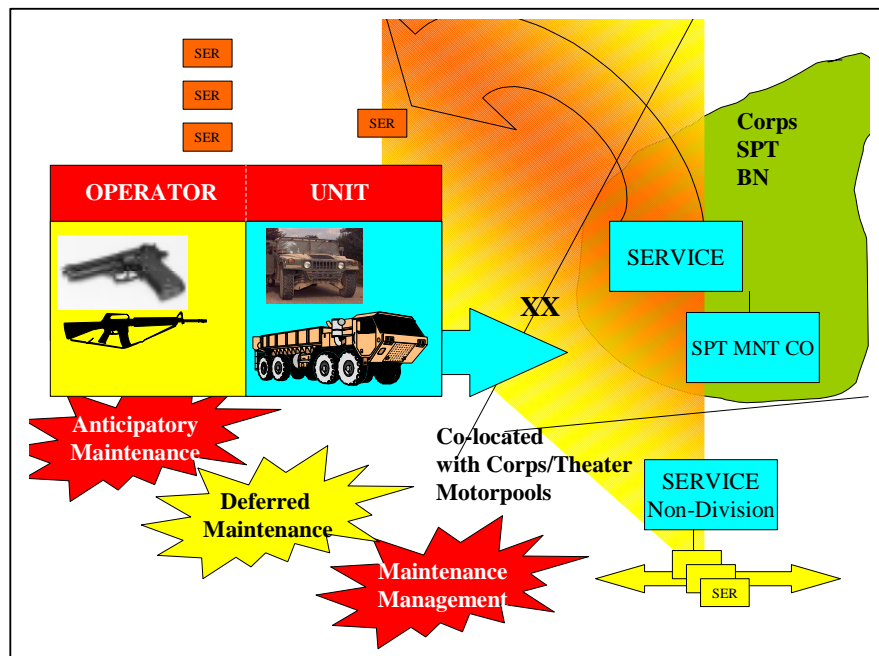


Figure 8-7. Repair and Return

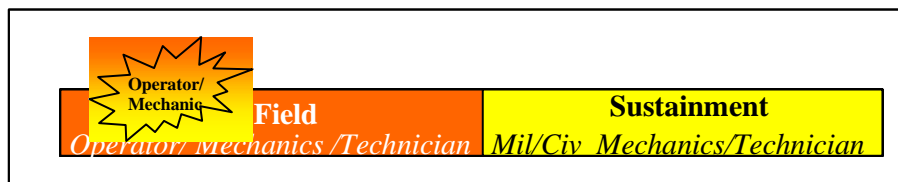


Figure 8-8. Two-Level Maintenance Management Spectrum

